

WHAT IS CLAIMED IS:

1. A method for enhanced decision making based on optimization of a drilling system using an economic evaluation factor comprising:

- 5       generating a first economic evaluation factor for the drilling system by using an iterative drilling simulation of a well bore in a formation based on a prescribed drilling simulation model, wherein the drilling system including a drilling mechanics parameter;
- 10       determining whether the first economic factor achieves a desired optimization; and

      based on the determination, varying the drilling mechanics parameter of the drilling system such that the iterative drilling simulation generates a second economic

15       evaluation factor and determines whether the second economic evaluation factor achieves the desired optimization.

2. The method of Claim 1, wherein the drilling
- 20       mechanics parameters comprise at least one drill bit input selected from a group consisting of bit type, bit diameter, bit cutting structure 3D (three dimensional) model, bit work rating, bit junk slot area, bit total flow area (TFA), bit pressure drop, impact force, jet
- 25       velocity and drill bit costs.

3. The method of Claim 1, further comprising modifying the iterative drilling simulation to take into account drill bit enhancements.

4. The method of Claim 1, further comprising  
generating a preliminary recommendation including a list  
of drilling equipment based on the drilling mechanics  
parameter of the drilling system that generated the  
5 economic evaluation factor that achieved the desired  
optimization.

5. The method of Claim 4, further comprising  
displaying the preliminary recommendation.

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6. The method of Claim 4, further comprising  
viewing the preliminary recommendation on a computer  
monitor.

15 7. The method of Claim 4, further comprising  
specifying additional drilling equipment considerations  
for use with the drilling system of the preliminary  
recommendation such that the iterative drilling  
simulation generates a third economic evaluation factor  
20 for an additional preliminary recommendation.

8. The method of Claim 7, wherein additional  
drilling equipment considerations comprise potential  
component changes.

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9. The method of Claim 7, wherein additional  
drilling equipment considerations comprise replacing a  
drill bit used in the drilling rig system.

10. The method of Claim 7, further comprising  
selecting an overall recommendation from the preliminary  
recommendation and the at least one additional  
preliminary recommendations based on the economic  
5 evaluation factor.

11. The method of Claim 10, further comprising  
displaying the overall recommendation in a compressed  
time animation, wherein a user may view a simulation of  
10 the drilling system drilling the well bore.

12. The method of Claim 10, further comprising  
formatting the overall recommendation in hardcopy, CD  
ROM, computer readable media, electronic file,  
15 holographic projection, compressed time animation, or any  
combination thereof.

13. A program product for enhanced decision making to recommend a drilling rig system using an economic evaluation factor to achieve a desired optimization of the drilling rig system comprising:

- 5           a computer-usable medium; and  
          computer instructions encoded in the computer-usable medium, wherein the computer instructions, when executed, cause a computer to perform operations comprising:
- 10           generating a first economic evaluation factor for a drilling rig system by using an iterative drilling simulation of a well bore in a formation based on a drilling simulation model;
- including a drilling mechanics parameter in the drilling simulation model;
- 15           determining whether the first economic factor achieves a desired optimization; and  
          based on the determination, varying the drilling mechanics parameter such that the drilling simulation model generates a second economic evaluation factor and
- 20           determines whether the second economic evaluation factor achieves the desired optimization.

14. The program product of Claim 13, wherein  
varying the drilling mechanics parameter comprises  
modifying at least one drill bit input selected from a  
group consisting of bit type, bit diameter, bit cutting  
5 structure 3D (three dimensional) model, bit work rating,  
bit junk slot area, bit total flow area (TFA), bit  
pressure drop, impact force, jet velocity and drill bit  
costs.

10 15. The program product of Claim 13, further  
comprising modifying the iterative drilling simulation to  
take into account drill bit enhancements.

15 16. The program product of Claim 13, further  
comprising generating a preliminary recommendation  
including a list of drilling equipment based on the  
drilling mechanics parameter that achieved the desired  
optimization.

20 17. The program product of Claim 16, further  
comprising displaying the preliminary recommendation.

25 18. The program product of Claim 16, further  
comprising viewing the preliminary recommendation on a  
computer monitor.

19. The program product of Claim 16, further comprising specifying an additional drilling equipment consideration for use with the drilling rig system of the preliminary recommendation such that the iterative  
5 drilling simulation generates a third economic evaluation factor for an additional preliminary recommendation.

20. The program product of Claim 19, further comprising including potential drilling rig upgrades as  
10 the additional drilling equipment consideration.

21. The program product of Claim 19, further comprising replacing a drilling rig component used in the drilling rig system as the additional drilling equipment  
15 consideration.

22. The program product of Claim 19, further comprising selecting an overall recommendation from the preliminary recommendation and the at least one  
20 additional preliminary recommendations based on the economic evaluation factor.

23. The program product of Claim 22, further comprising displaying the overall recommendation in a  
25 compressed time animation, wherein a user may view a simulation of the drilling rig system drilling the well bore.

24. The program product of Claim 22, further  
comprising formatting the overall recommendation in  
hardcopy, CD ROM, computer readable media, electronic  
file, holographic projection, compressed time animation,  
5 or any combination thereof.

25. A method of enhanced decision making for the recommendation of a drill bit for a drilling system based on an economic evaluation factor comprising:

generating a first economic evaluation factor for  
5 the drilling system by using an iterative drilling simulation of a well bore in a formation based on a drilling mechanics parameter of a drill bit used in the drilling rig system;

determining whether the first economic factor  
10 achieves a desired optimization;

based on the determination, varying the drilling mechanics parameter of the drill bit such that the iterative drilling simulation generates a second economic evaluation factor and determines whether the second  
15 economic evaluation factor achieves the desired optimization; and

generating a preliminary recommendation based on the economic evaluation factor that achieved the desired optimization, the preliminary recommendation including a  
20 list of drilling components, such as the drill bit, for use in the drilling system.

26. The method of Claim 25, selecting the drilling mechanics parameter of the drill bit from a group  
25 consisting of a bit type, bit diameter, bit cutting structure 3D (three dimensional) model, bit work rating, bit junk slot area, bit total flow area (TFA), bit pressure drop, impact force, jet velocity and drill bit costs.



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PATENT APPLICATION

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27. The method of Claim 25, further comprising modifying the iterative drilling simulation to take into account drill bit enhancements.